

What is claimed is:

- 1    1.     A method comprising:  
2         receiving a video stream comprising a plurality of image frames, each image  
3         frame comprising a matrix of pixels;  
4         selecting a subset of the image frames;  
5         for each image frame in the subset determining a sub-fingerprint for the  
6         image frame; and  
7         assembling the sub-fingerprints into a fingerprint for the video stream.
  
- 1    2.     The method of claim 1, further comprising:  
2         transmitting the fingerprint to a fingerprint verification system; and  
3         comparing the fingerprint to a predetermined fingerprint for the video  
4         stream.
  
- 1    3.     The method of claim 1, wherein selecting the subset of the image frames  
2         includes reading control codes from the video stream, said control codes identifying  
3         the subset of the image frames.
  
- 1    4.     The method of claim 1 wherein determining a sub-fingerprint for the image  
2         frame comprises:  
3         computing a discrete cosine transformation (DCT) block for a pixel block  
4         surrounding a pixel, said DCT block having coefficients;  
5         computing an estimation of a variance of the coefficients;  
6         setting a variance value in a variance matrix with the estimation of the  
7         variance, wherein the value is set at a position in the variance matrix corresponding  
8         to the pixel position in the image frame matrix;  
9         determining a minimum variance value in a signature window of the  
10        variance matrix enclosing the pixel position; and  
11        setting a first predetermined value representing the minimum variance in a  
12        constellation matrix at a position corresponding to the minimum variance value and

13    setting all other positions in the signature window to a different predetermined  
14    value.

1     5.     The method of claim 4, further comprising encoding the sub-fingerprint.

1     6.     The method of claim 5, wherein the encoding comprises a run-length  
2     encoding.

1     7.     The method of claim 4, wherein the DCT block has a size of eight by eight.

1     8.     The method of claim 4, wherein the signature window has a size of eight by  
2     eight.

1  
2     9.     A device comprising:  
3           a processor;  
4           a network interface module operable to receive video data, the video data  
5     comprising a plurality of frames, each frame comprising a pixel matrix;  
6           a memory coupled to the processor for storing the pixel matrix, a variance  
7     matrix, and a constellation matrix; and  
8           a fingerprint generation module executing on the processor and operable to:  
9                determine a discrete cosine transformation (DCT) block for a pixel  
10          block surrounding a pixel in the pixel matrix, said DCT block having  
11          coefficients;  
12                compute an estimation of a variance of the coefficients;  
13                set a variance value in the variance matrix with the estimation of the  
14          variance, wherein the value is set at a position in the variance matrix  
15          corresponding to the pixel position in the image frame matrix;  
16                determine a minimum variance value in a signature window of the  
17          variance matrix enclosing the pixel position; and

18                    set a first predetermined value representing the minimum variance in  
19                    the constellation matrix at a position corresponding to the minimum variance  
20                    value and setting all other positions in the signature window to a different  
21                    predetermined value.

1    10.    The device of claim 9, wherein the fingerprint generation module is further  
2    operable to run-length encode the sub-fingerprint.

1    11.    The device of claim 9, wherein the DCT block has a size of eight by eight.

1    12.    The device of claim 9, wherein the signature window has a size of eight by  
2    eight.

1    13.    The device of claim 9 further comprising a DCT accelerator operable to  
2    calculate the DCT coefficients.

1    14.    The device of claim 9, wherein the processor and memory are housed in a  
2    set-top box.

1    15.    The device of claim 9, wherein the processor and memory are housed in a  
2    personal computer.

1    16.    A system comprising  
2            a video server communicably coupled to a communication channel and  
3    operable to transmit a video data stream through the communication channel;  
4            a video receiver communicably coupled to the communication channel and  
5    operable to:  
6            receive the video data stream;  
7            determine a subset of images in the video data stream;  
8            calculate a sub-fingerprint for each of the subset of images;

9                   assemble the sub-fingerprint for each of the subset of images into a  
10 fingerprint; and  
11                   transmit the fingerprint to a fingerprint verification module.

1   17.    The system of claim 16, further comprising a fingerprint mismatch database  
2   operable to store a reference fingerprint for the video data stream and wherein the  
3   fingerprint verification module is operable to compare the fingerprint to the  
4   reference fingerprint.

1   18.    The system of claim 16, wherein the fingerprint verification module is  
2   located with the video server.

1   19.    A machine-readable medium having machine executable instructions for  
2   performing a method, the method comprising:  
3        receiving a video stream comprising a plurality of image frames, each image  
4   frame comprising a matrix of pixels;  
5        selecting a subset of the image frames;  
6        for each image frame in the subset determining a sub-fingerprint for the  
7   image frame; and  
8        assembling the sub-fingerprints into a fingerprint for the video stream.

1   20.    The machine-readable medium of claim 19, wherein the method further  
2   comprising:  
3        transmitting the fingerprint to a fingerprint verification system; and  
4        comparing the fingerprint to a predetermined fingerprint for the video  
5   stream.

1   21.    The machine-readable medium of claim 19, wherein selecting the subset of  
2   the image frames includes reading control codes from the video stream, said control  
3   codes identifying the subset of the image frames.

1 22. The machine-readable medium of claim 19 wherein determining a sub-  
2 fingerprint for the image frame comprises:  
3 computing a discrete cosine transformation (DCT) block for a pixel block  
4 surrounding a pixel, said DCT block having coefficients;  
5 computing an estimation of a variance of the coefficients;  
6 setting a variance value in a variance matrix with the estimation of the  
7 variance, wherein the value is set at a position in the variance matrix corresponding  
8 to the pixel position in the image frame matrix;  
9 determining a minimum variance value in a signature window of the  
10 variance matrix enclosing the pixel position; and  
11 setting a first predetermined value representing the minimum variance in a  
12 constellation matrix at a position corresponding to the minimum variance value and  
13 setting all other positions in the signature window to a different predetermined  
14 value.

1 23. The machine-readable medium of claim 22, wherein the method further  
2 comprises encoding the sub-fingerprint.

1 24. The machine-readable medium of claim 23, wherein the encoding comprises  
2 a run-length encoding.

1 25. The machine-readable medium of claim 22, wherein the DCT block has a  
2 size of eight by eight.

1 26. The machine-readable medium of claim 22, wherein the signature window  
2 has a size of eight by eight.